



Maryland
Department of
the Environment

Yard Waste, Food Residuals, and Other Organic Materials Diversion and Infrastructure – Study

Health and Safety Concerns

September 20, 2018



MDE's Charge

The Department shall...

“identify any applicable sanitary and public health concerns related to yard waste, food residuals, and other organic materials composting and diversion.”

Ch. 384 of 2017



MDE's Charge (2)

- Today's meeting will focus on potential health impacts related to:
 - Mulching and other recycling of natural wood waste; and
 - Composting of yard trimmings, food scraps, and other organics.



Agenda

- I. Potential health issues raised - *MDE*
- II. Composting facilities: existing controls - *MDE*
- III. Natural wood waste (NWW) facilities: existing controls - *MDE*
- IV. Groundwater quality near NWW and composting facilities - *MDE*
- V. Air-related health impacts - *MDH*
- VI. Discussion - *Study group members*
- VII. Public comments - *interested parties*



Potential Health Issues Raised

- **Air-related issues**
 - Particulate matter (PM) dust generated by road traffic and volatile organic compound (VOC) production.
 - Wood dust generated by wood grinding.
 - Mold and spores generated during decomposition of organic materials and potentially spread during pile turning or other management.
- **Groundwater-related issues**
 - Leaching of “contact water” from piles of organic materials that contains nutrients and other pollutants into the ground.
 - Production of natural organic acids that liberate metals already present in the soil.
- **Surface water issues**
 - Runoff of “contact water” containing nutrients and other pollutants to surface water.
- **Other health issues**
 - Exposure to pathogens in the feedstocks.
 - Harborage of disease vectors.

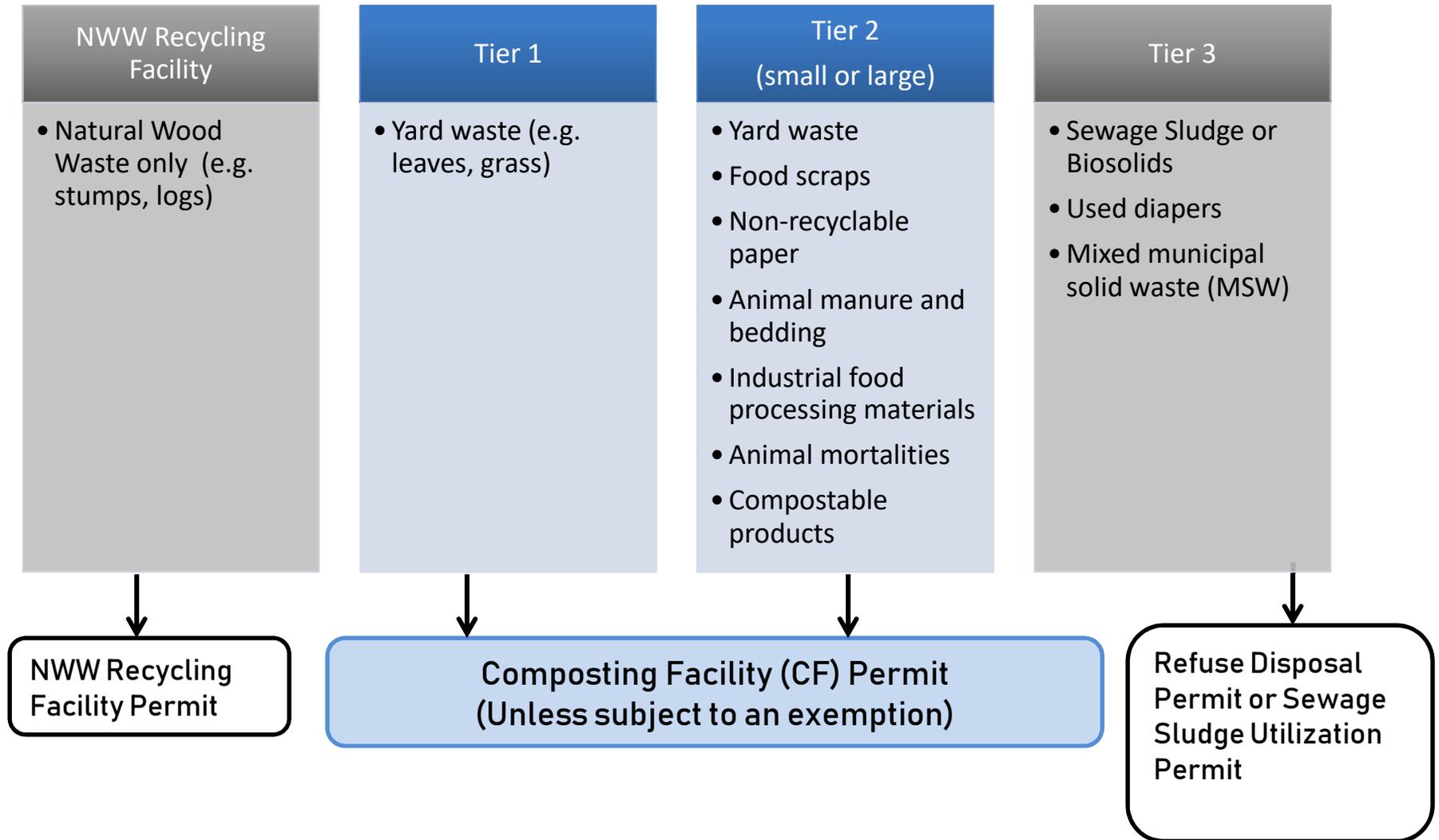


Regulatory Requirements

- The composting regulations can be found at COMAR 26.04.11 and on the Department's Organics Diversion and Composting web page at www.mde.Maryland.gov/composting.
- The following summarizes requirements relevant to the potential health issues raised and is not a complete list of all requirements.



Facility Tiers





General Restrictions

- Apply to all composting facilities, even those exempt from a composting facility permit.
- A person may not engage in composting in a manner which will likely...
 - Create a nuisance;
 - Be conducive to insect and rodent infestation or the harborage of animals;
 - Cause nuisance odors or other air pollution in violation of [air regulations] or [operate without required air permit];
 - Cause [an unpermitted] discharge of pollutants derived from organic materials or solid waste to waters of this State;
 - Harm the environment; or
 - Create other hazards to the public health, safety, or comfort as may be determined by the Department.



Setbacks

- Except where a greater setback is required by local, State, or federal law or regulations, feedstock receipt, feedstock storage, active composting, curing, and compost storage areas of a composting facility may not be located closer than:
 - 50 feet to the property line of a property not owned or controlled by the operator of the composting facility;
 - 300 feet to a dwelling not owned or operated by the operator of the composting facility;
 - 100 feet to a domestic well; and
 - 100 feet to a stream, lake, or other body of water except an impoundment for use in the composting process.



Air and Dust

- **Fire prevention:**
 - The operations plan must contain an emergency preparedness plan for responding to and minimizing the occurrence of fires.
 - Pile height and spacing must be specified in the operations plan and must comply with any local requirements and fire codes.
 - Piles must be monitored for temperature.
- **Permit condition: dust resulting from the facility's operation shall be controlled at all times.**



Pathogens and Vector Attraction

- Feedstock limitations: sewage sludge, mixed solid waste, and used diapers are not allowed at Tier 1 or 2 facilities.
- All compost must undergo the “Process to Further Reduce Pathogens”
 - 55 degrees C for at least 15 days (windrows) or 3 days (aerated static piles or in-vessel)
- Tier 2 facilities must also implement a vector attraction reduction method.
- Any incoming food scraps or manure must be incorporated into the compost pile, covered, or transferred to leakproof containment by the end of the operating day on which they are received.
- Plans for pathogen reduction and vector attraction reduction must be included in the operations plan.



Groundwater (1)

- **Depth to groundwater.**
 - Surfaces must have a minimum of 2 to 4 feet depth to the seasonal high water table, depending on where the facility is located.
- **Slope of surfaces.**
 - Surfaces must be sloped between 1 and 6 percent, as determined by site conditions and as sufficient to prevent ponding, except for areas located indoors, which shall have slope sufficient to prevent ponding and facilitate cleaning.



Groundwater (2)

Pad requirements.

- **Tier 1 Facilities:** surfaces used for feedstock receiving, feedstock storage, active composting, curing, and compost storage shall be composed of an all-weather pad.
- **Tier 2 Small Facilities.**
 - Surfaces used for feedstock receiving, feedstock storage, curing, and compost storage shall be composed of an all-weather pad.
 - Surfaces used for active composting shall be composed of:
 - An all-weather pad with a 6-inch layer of carbon-rich substrate such as wood chips placed beneath each active composting pile or windrow, above the all-weather pad; or
 - A low-permeability pad constructed in accordance with the requirements for Tier 2 Large Facilities, if the requirements for management of contact water are also met.
 - A 6-inch layer of compost or carbon-rich material must also be placed on top of each active pile.



Groundwater (3)

Pad requirements, continued:

- **Tier 2 Large Facilities.**
 - Surfaces used for curing and compost storage shall be composed of an all-weather pad.
 - Surfaces used for feedstock receipt, feedstock storage, and active composting shall be constructed of a low-permeability pad.



Groundwater (4)

Pad requirements, continued:

- “Low-permeability pad” criteria:
 - A pad constructed on the surface of the ground shall have a hydraulic conductivity of 1×10^{-5} cm/sec or less;
 - A pad that is buried shall have a hydraulic conductivity of 1×10^{-6} cm/sec or less;
 - A pad made of asphalt concrete or Portland cement concrete shall be designed to minimize the potential for cracking and allow equipment to operate without damage; and
 - A pad made of compacted clay shall have a minimum thickness of 1 foot and shall be protected from desiccation and installed in a manner such that the integrity of the pad will not be impaired by the operation of heavy equipment used on the pad.



Groundwater (5)

Groundwater monitoring.

- The Department may require a composting facility to install monitoring wells and conduct groundwater monitoring if:
 - The composting facility is located in karst terrain;
 - The composting facility is located in a wellhead protection area; or
 - The Department otherwise considers monitoring necessary to adequately protect groundwater because of the particular characteristics of the site.



Groundwater and Surface Water

Stormwater management.

- The composting facility shall be designed to manage any stormwater discharges associated with industrial activity, as defined in 40 CFR §122.26(b)(14), in accordance with:
 - The NPDES permit issued by the Department;
 - State and local stormwater requirements; and
 - State and local erosion and sediment control requirements.
- Run-on
 - Structures such as berms or ditches shall be used to prevent run-on to the feedstock receiving, feedstock storage, active composting, curing, and compost storage areas.



Groundwater and Surface Water (2)

Contact water management.

- Contact water is liquid that has contacted raw feedstocks or active composting material.
- It includes runoff from feedstock receiving area, feedstock storage area, or active composting area.
- For Tier 1 and Tier 2 Small: No separate requirements for contact water. Manage as stormwater.



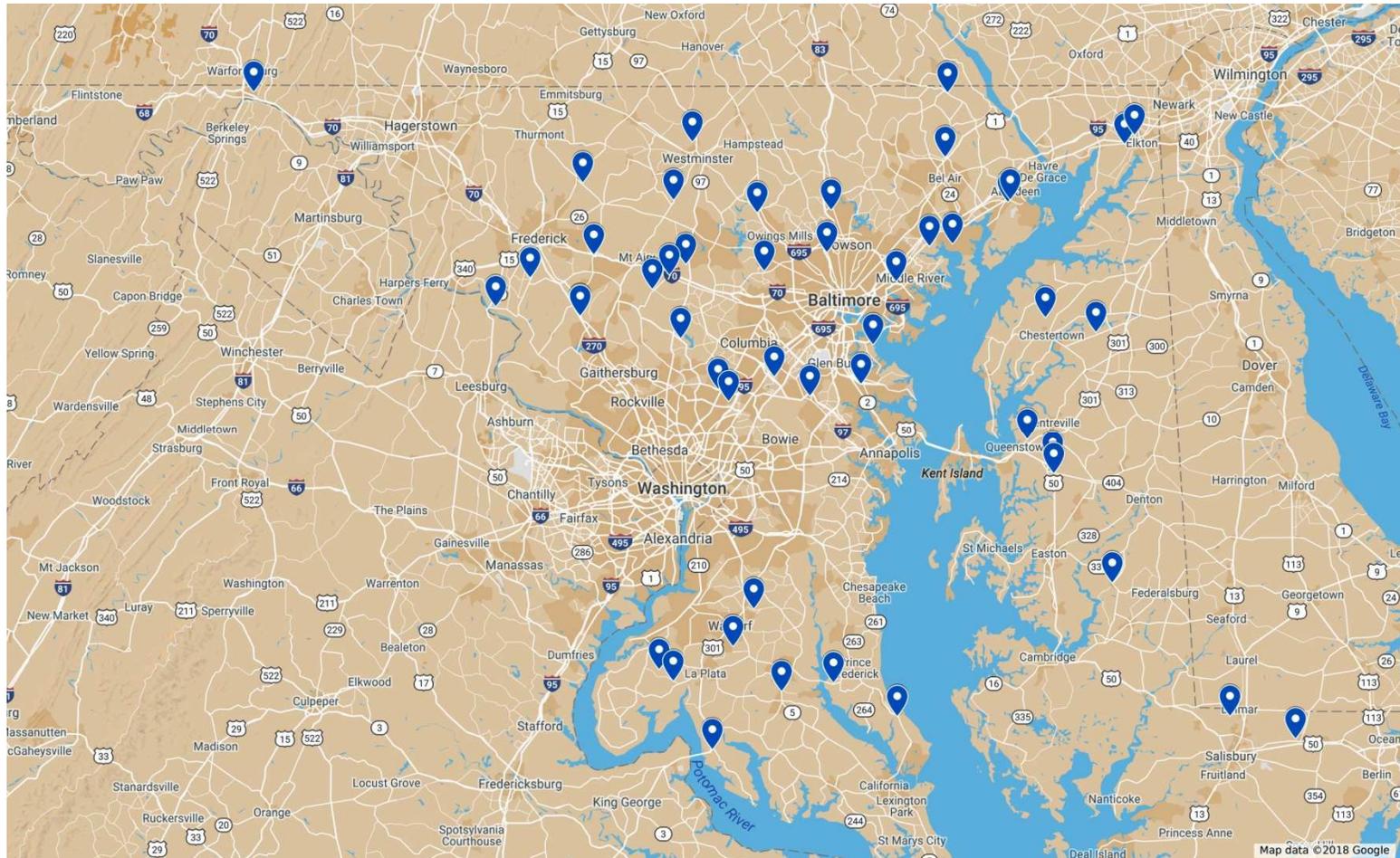
Groundwater and Surface Water (3)

Contact water management, cont'd.

- **Tier 2 Large Facilities.**
 - **Must collect and contain contact water before:**
 - Reuse on feedstock storage or active composting piles;
 - Transport off site for treatment at a permitted facility; or
 - Discharge on site pursuant to COMAR 26.08.01 - .04. (MDE surface or groundwater discharge permit).
- **The collection basin, tank, or other containment system used to collect contact water shall:**
 - Be sized to handle at least a 24-hour, 25-year storm event;
 - For a basin, have a synthetic or compacted clay liner with a hydraulic conductivity of 1×10^{-7} cm/sec or less;
 - For a liner constructed of compacted clay, have a thickness of at least 1 foot; and
 - For a tank or other containment system, be constructed of impermeable material.



Natural Wood Waste Facilities





What is “Yard Waste”? “NWW”?

- “Yard waste” is defined in Section 9-1701(t) of the Environment Article as
 - “*(t) Yard waste. --*
 - (1) “Yard waste” means organic plant waste derived from gardening, landscaping, and tree trimming activities.*
 - (2) “Yard waste” includes leaves, garden waste, lawn cuttings, weeds, and prunings.”*
- “Natural Wood Waste” (NWW) means tree and other natural vegetative refuse, and includes tree stumps, brush and limbs, root mats, logs, leaves, grass clippings, unadulterated wood wastes, and other natural vegetative materials. (From COMAR 26.04.09.02B(4)).



Natural Wood Waste

- The regulatory system for natural wood waste (NWW) was established in 1991 by Environment Article Section 9-1708, which directed the Department to establish a permitting system for natural wood waste composting facilities, and directed us to write regulations to create the system by July 1, 1992.
- These regulations are codified as COMAR 26.04.09.
- NWW operations are limited to the composting of wood chips into mulch, and related wood-chip products (some aren't composted).
- The purpose of the regulations was largely to address the risk of spontaneous combustion and other fires.



Natural Wood Waste Permitting I

- Commercial natural wood waste facility operators are required to obtain NWW permits.
- Governmental operators are exempt, although those that are located at refuse disposal facilities are regulated through a section of that permit which has similar requirements.



NWW Permitting II

- An application must include (from COMAR 26.04.09.05):
 - (a) A description of the project for which approval is requested, including how the requirements in Regulation .07 of this chapter shall be met;
 - (b) A description of all other applicable permits required under local, State, or federal statutes;
 - (c) A marketing plan and strategy for the product or products produced at the facility; and
 - (d) Copies of plans and engineering reports as described in §B of this regulation.



NWW Permitting III

- The plans include:
- A description of the facility
- Operations manual
- Stormwater and Erosion and Sediment Control plans
- Fire control plan and emergency preparedness manual
- Numerous other items



NWW Operational Requirements I

- **Operational standards include requirements for:**
 - Maintenance of pile spacing and height restrictions
 - Dust control
 - Fire prevention procedures per the Fire Marshal
- **The Department may require that the natural wood waste recycling facility conduct processing activities involving unloading, separation, reduction, or alteration in an enclosed building, screened from adjoining properties, or buffered from adjoining properties at a distance determined by the Department.**



NWW General Prohibitions

From COMAR 26.04.09.03: “A person may not engage in natural wood waste recycling in a manner which will likely:

- (1) Create a nuisance;
- (2) Be conducive to insect and rodent infestation or the harboring of animals;
- (3) Cause a discharge of constituents derived from natural wood waste into the air unless otherwise permitted by the Department;
- (4) Cause a discharge of constituents derived from natural wood waste to waters of this State unless otherwise permitted by the Department;
- (5) Harm the environment; or
- (6) Create other hazards to the public health, safety, or comfort as may be determined by the Department.”



Groundwater I

- The Department is aware that the composting of nutrient rich feedstocks such as manure and food waste has the potential to leach nutrients and other pollutants into the surface and groundwater.
- Yard waste and NWW can liberate some naturally occurring compounds such as humic and fulvic acids.
- Other pollutants such as ammonia, alcohols and acetone can be created if the piles are allowed to become anaerobic.
- This is why the Composting Regulations contain significant controls for surface and groundwater protection for the Tier 2 Large facilities.



Groundwater II

- Although Maryland does not require groundwater monitoring at most NWW sites, some are located at municipal landfills and other sites where groundwater monitoring already exists.
- We have not generally seen significant water quality changes down-gradient of the composting areas relating to the composting.
- Some are NWW, some are yard waste such as leaves and grass.
- The last 5 years of NPDES discharge permit monitoring data for the two large yard waste composting facilities operated by MES indicates that the facilities are in compliance with effluent limits in their discharge permits, and working with Water and Science Administration to achieve benchmarks to lower the amounts of phosphorus and iron coming from the sites.



Groundwater III

Of the 13 composting facilities that are located at landfills with monitoring systems:

- 4 are not well monitored – Landfill monitoring wells are distant or not directly down-gradient of the area where the composting is occurring. No impact seen.
- 4 have confirmed other sources of contaminants that predate the composting, such as a landfill or fuel spill; no changes related to composting.
- 3 have had no observed change in water quality.



Groundwater IV

- One landfill has had an MCL exceedance for nitrates in one well downgradient of the NWW/yard waste area in 2016. The well hovered near the MCL of 10 for the last 5 years, and in 2016 peaked at 13.4 ppm (declining in 2017 to below 10). No other inorganic parameters exceeded any groundwater protection standards in any of the wells at the site. This area is adjacent to an area affected by the old unlined landfill – additional multi-level wells are being installed to determine the source.
- One landfill has shown no water quality changes downgradient of the NWW area, but increasing trends for TDS, NH₃, Hg and Be downgradient of the yard waste area. The MCLs for Be and Hg were exceeded in 2016, but declined below the MCLs in 2017. The County has been asked to investigate this observation.



Groundwater V

Additionally, the following groundwater impacts were historically observed at privately operated sites not located at landfills, that pre-dated the composting regulations:

- Minor impact at two sites which had both composting and landfilling of NWW:
 - The impact was largely limited to salts and iron at low levels.
 - Both had had very large fires, which could contribute to the release of salts and metals much faster than by the natural decomposition of the woody organic matrix.
- A food composter, since shut down, was found to have odor, vector attraction, and surface water pollution issues.
 - Later found to have significant ammonia concentrations in the groundwater.
 - The facility was not operating in an aerobic manner, leading to ammonia production.
- A second food composter had a similar situation to a much lesser extent, and has since largely resolved its operational issues. We saw impacts in the food waste area, but not from the NWW area.



Groundwater Summary

- Two of 13 composting facilities at permitted landfills are showing an impact that could potentially be related to composting activities – neither is yet confirmed.
- No known impact by any of the NWW facilities (unless they had a large fire or a dump).
- No known impact by a composting facility on any domestic water supply.
- We consider the set of controls in the composting regulations, which applied additional protections for Tier 2 Large facilities, to be appropriate.



Suffolk Co. NY Groundwater Report

- Suffolk Co. NY, on eastern Long Island, did a study while considering whether to conduct more monitoring at composting facilities.
- The facilities studied were not purely NWW facilities, they were largely mixed green waste composters as well as wood. The report describes some as being just yard waste, most as “vegetative organic waste materials” – natural wood and other vegetative materials.



Suffolk County Report 2

- The study found that of the 11 vegetative sites studied, they all had elevated manganese, and some had additional metals at levels over standards. Two had at least one well with elevated levels of radioactive parameters.
- Note that some sites had been in use for decades, and had other waste disposal activities associated with them, e.g., prior landfilling, sewage management, auto dismantling, etc.
- Only one of the 11 sites investigated had an upgradient monitoring well for detection of chemicals coming from an upgradient source.



Suffolk County Report 3:

And other offsite sources were identified:

- The study identified possible other sources for salts and metals in several cases, including:
 - historical use as a scrapyards at two sites;
 - an adjacent landfill at another, and
 - possible influence by highway de-icing salt at another located along an access road to the Long Island Expressway.
- The study discovered “septage”-related compounds such as cosmetics and medications, at nearly every site, which demonstrates the extreme interconnectivity of the aquifer to surface and shallow-groundwater contaminant sources.

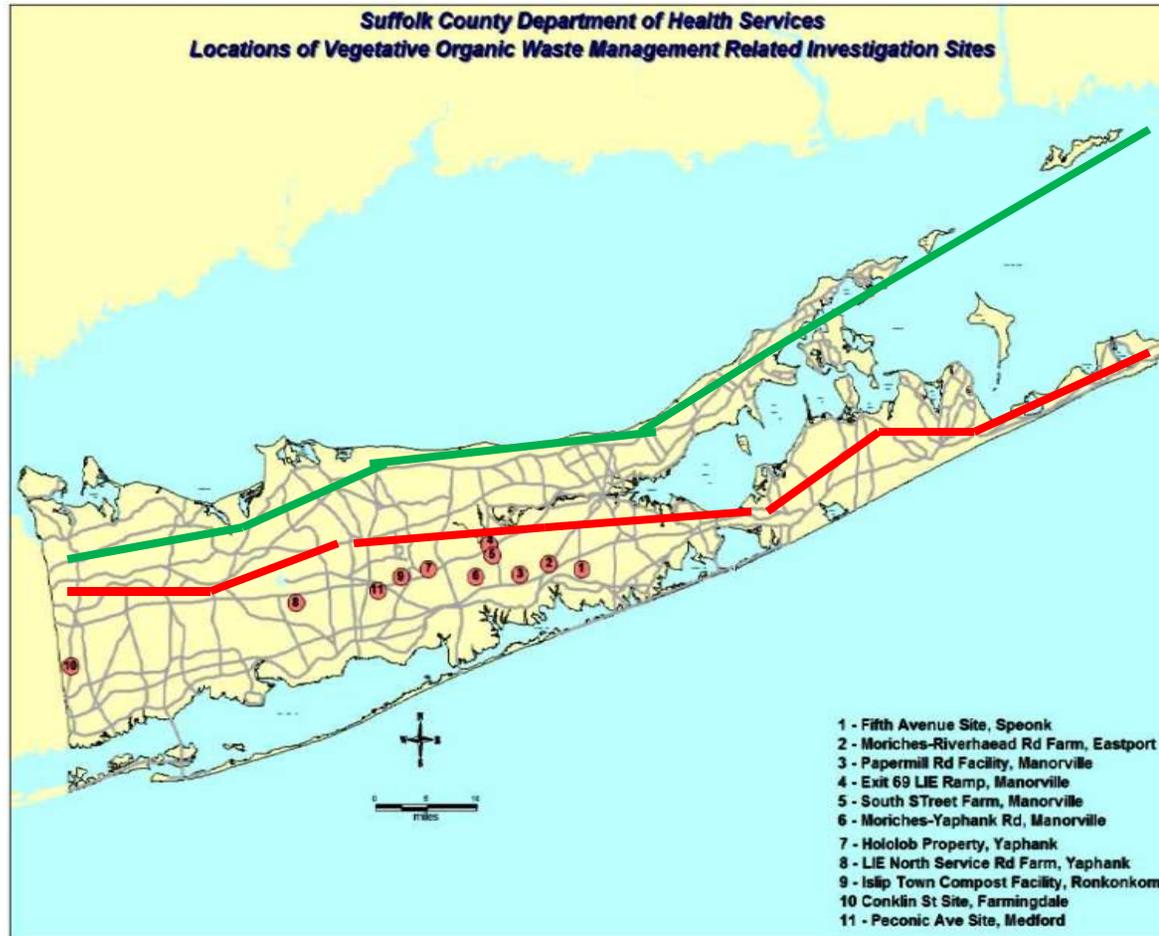


Suffolk County Report 4

- Maryland's geology is very different from Long Island's glacial outwash deposits, with soils that have markedly lower permeability than those of LI's outwash plains.
- LI's are lithologically more like Maryland's Paleochannel deposits on the lower Eastern Shore: extremely permeable sand and gravel.
- Maryland Piedmont counties have fine-grained soils developed from the decomposition of the parent bedrock, and tend to have the finer components above and saprolite and fractured bedrock below. Their permeability is 2 to 3 orders of magnitude lower than the LI surficial aquifers.



LI Report Sites and Moraines



From "Investigation of the Impacts to Groundwater Quality from Compost/Vegetative Organic Waste Management Facilities in Suffolk County" by the Suffolk County Dept. of Health Services, 1/22/2016, p. 3, with Moraine lines added for this presentation by E. Dexter.

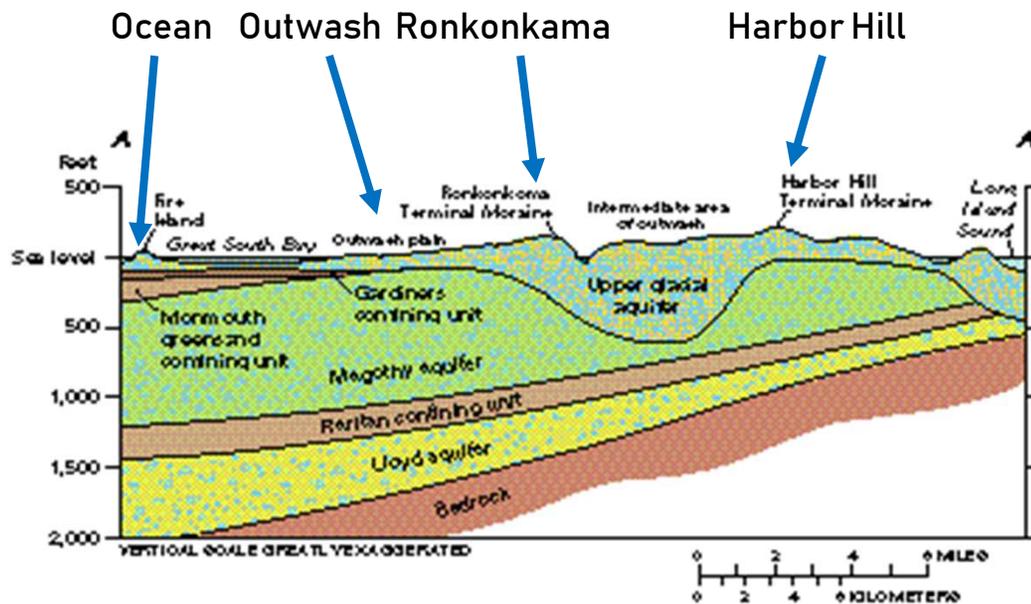
— Ronkonkoma Moraine

— Harbor Hills Moraine

Lines depict approximate centerline of these long, irregular hills. From various glacial maps of Long Island.



Outwash Plains



Modified from Soren, Julian, and Simmons, D.L., 1987, Thickness and hydrogeology of aquifers and confining units below the upper glacial aquifer on Long Island, New York: U.S. Geological Survey Water-Resources Investigations Report 86-4175, 3 sheets.

Figure 70. The upper glacial aquifer is in contact with the Magothy aquifer in most places and with the Lloyd aquifer under Long Island Sound. The Monmouth greensand and Gardiners confining units overlie the Magothy aquifer in the area of Great South Bay. The line of the section is shown in figure 69.

Cross-section of LI Sediments: Over most of the southern part of the island, the outwash sediments are in hydraulic connection with underlying Magothy Aquifer, with no confining units over 1000 feet down. Anything spilled can communicate with a deep well over time.

From the GROUND WATER ATLAS of the UNITED STATES Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont HA 730-M, Figure 670 https://pubs.usgs.gov/ha/ha730/ch_m/M-surf_Noratlantic.html accessed on 9/12/2018



Suffolk Summary

- The Suffolk report was designed to answer one question – whether to do more monitoring at the types of sites in the types of locations studied.
- It was done for and by regulators who were familiar with the geology of the area, so that is not addressed in detail even though it is crucial to a complete hydrogeological study.
- It points out risks that we are already aware of, but due to the geological setting is not directly comparable to Maryland conditions in most areas.